

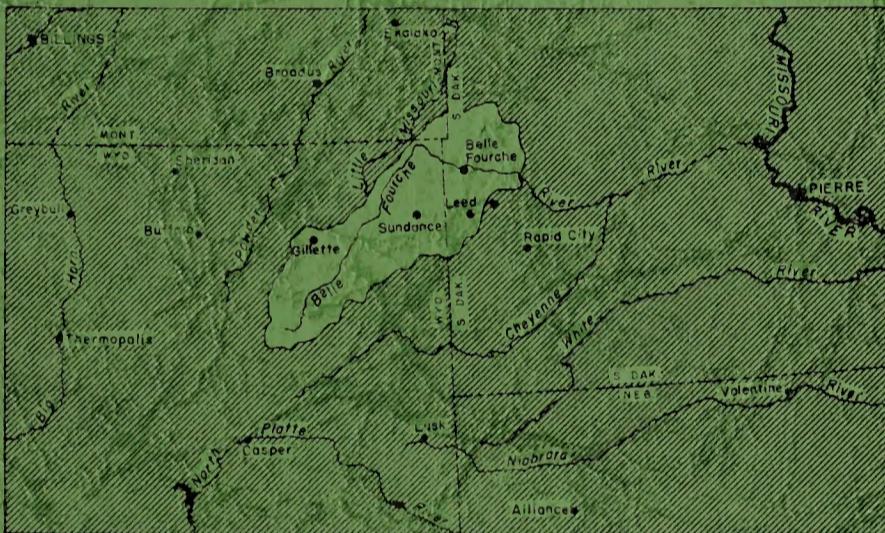


## LAND PLANNING AND CLASSIFICATION REPORT

AS RELATED TO THE PUBLIC DOMAIN LANDS

IN THE

# BELLE FOURCHE BASIN



## MONT., SO. DAK. & WYO.

A MISSOURI RIVER BASIN INVESTIGATION

(FOR ADMINISTRATIVE USE ONLY)

UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

REGION III

BILLINGS, MONTANA

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Preliminary  
Land Planning and Classification Report  
of the Public Domain Lands in the

BELLE FOURCHE BASIN

in

Montana, South Dakota, and Wyoming

A Missouri River Basin Investigation

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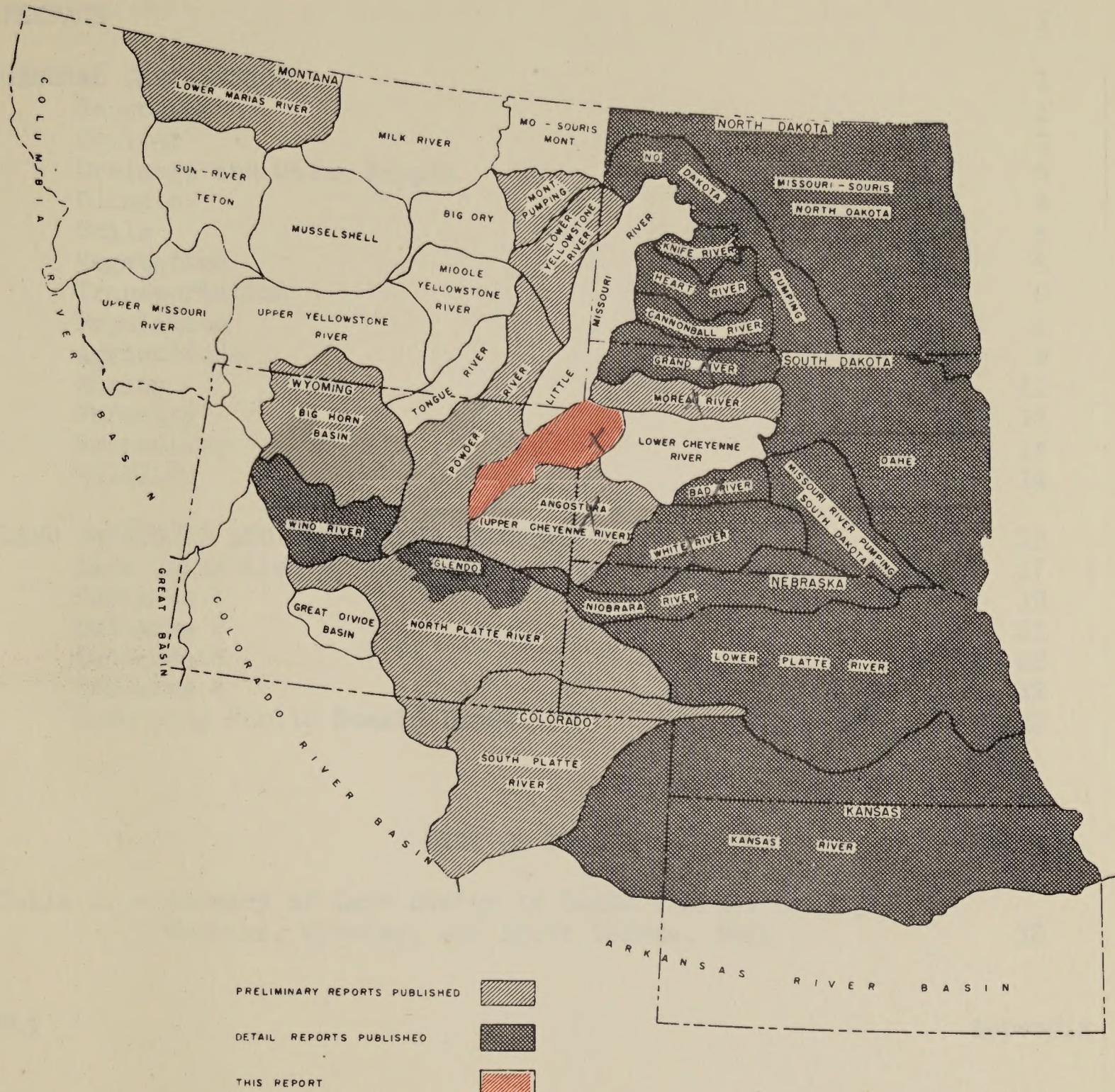
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This study is a feature of the program  
of the Department of the Interior for the development  
of the resources of the Missouri River Basin



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PRESENT STATUS OF BUREAU OF LAND MANAGEMENT  
STUDIES IN THE MISSOURI RIVER BASIN  
(LAND CLASSIFICATION)





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## PREFACE

This report is a preliminary analysis of the physical and economic features of lands in the Belle Fourche River drainage area. The location and extent of the public domain lands included in this drainage area is shown on the map accompanying this report, and it is suggested that it be displayed for ready reference while reviewing this report. This study was made as a feature of the Interior Department's comprehensive resource development program of the Missouri River Basin.

From the field reconnaissance and available information, specific problems as relate to the proper management or disposition of the public lands have been disclosed. It is necessary that detailed land classification and inventory studies be conducted in order that these problems may be properly studied. The principal sources of information for this report include land status records of the Bureau of Land Management and those of the U.S. Forest Service. Publications and personnel of governmental agencies furnished valued data. Ranchers, bankers, and other business men of the basin provided additional information pertaining to the study area. Resident executives of the Homestake Mine were particularly helpful with economic information pertaining to the area.

The reconnaissance field examinations and surveys were made and the report prepared by Charles R. Peteler and Michael T. Solan, Land Economists. The Area Manager (Montana III), Tom Dudley, was consulted during the course of the study, and his views have been incorporated in the report. The map was prepared under the supervision of William C. Anderson, Engineering Draftsman. The over-all study was under the direction of R.D. Nielson, Chief, Division of Land Planning, Region III, Bureau of Land Management, Billings, Montana.



# B E L L E   F O U R C H E   B A S I N

## GENERAL DESCRIPTION

The Belle Fourche River Basin, as shown on the accompanying map, includes parts of Campbell, Crook, and Weston Counties in northwestern Wyoming; a small corner of Carter County in southeastern Montana; and portions of Butte, Lawrence, and Meade Counties in northwestern South Dakota. On the north, the basin is bounded by the Moreau River Basin, in South Dakota; by the Little Missouri River Basin, in Montana and Wyoming; and by the Little Powder River drainage, in Wyoming. On the west, in Campbell County, Wyoming, it adjoins the Powder River watershed, while the divide to the south is common to the Cheyenne River watershed and its tributaries in Wyoming and South Dakota. The drainage area of the Belle Fourche River, lying below the existing Belle Fourche Reclamation Project in Butte and Meade Counties, South Dakota, is not included in this study. The drainage areas of Willow Creek, Nine Mile Creek, and Whitewood Creek, all tributaries of the Belle Fourche River, form the eastern boundary of this report area. With an east-west length of about 210 miles, and an average width of 27 miles, this basin embraces a total tri-state area of 5,640 square miles, almost two-thirds of which lies in Wyoming.

## Geography

The Belle Fourche River Basin is characterized by pronounced physiographic features. While much of the area belongs to the rolling Missouri Plateau Section of the Great Plains province, it possesses physical characteristics of a most rugged nature as well - the Black Hills province. This group of mountains, which rise four thousand feet above the surrounding plateau, is carved from a cone-shaped uplift of the earth's crust, and consists largely of rocks that are older and therefore stratigraphically lower than those that form the surface of the adjoining plains. Salient features of the group are Hogback Ridge, an inward-facing single-crested ridge of hard sandstones, which forms its outer encircling rim, and Red Valley, a moat-like depression that completely encircles the uplift. The Limestone Plateau is an abruptly rising highland belt of rolling hills, fairly level valleys, west-facing cliffs, seamed with deep vertical-walled canyons. The central area of crystalline rocks is the heart of the Black Hills, an elevated basin in which scattered rocky ridges and peaks are interspersed with park-like valleys. A northwestern prolongation of the Black Hills is the high igneous uplift known as the Bear Lodge Mountains. This range radiates in steep, rocky slopes and escarpments, deeply cut by canyons, culminated by Warren Peaks, the elevation of which is about 6,700 feet.

Physiographic features pertaining to the Great Plains province are the upland plains, rolling hills, and wide valleys with occasional low escarpments, ridges, plateaus, and buttes, which are significant

features when compared to the higher ridges and mountains of the adjoining Black Hills. The entire northeast and southwest portions of the basin are of the characteristic plains type of country with the massive elliptical uplift of the Black Hills intervening throughout the central and southeastern region.

One of the most notable topographic features in the Belle Fourche River Basin is Devil's Tower, a huge, fluted, nearly circular igneous shaft which rises to a height of 1,280 feet above the bed of the nearby Belle Fourche River and some 865 feet from its apparent base on the sloping sandstone plateau from which it rises. The plateau, deeply incised by numerous canyons, rises irregularly from the Belle Fourche in long slopes toward the west. On top of the plateau rise the Missouri Buttes, a mass of igneous rocks forming a small group of prominent summits of which the highest reaches an altitude of 5,372 feet.

Another significant topographic feature is the Stoneville Flats, a smooth-bottomed valley that extends completely across the low divide between the Little Missouri River and the northern-most point of the Belle Fourche River. Originally, it was occupied by the upper drainage of the Belle Fourche, which then flowed northward into the Little Missouri. The change in the course of the stream is an excellent example of stream robbery. The lower Belle Fourche, with the advantage of steeper declivity, having cut back the head of its deeply entrenched valley until, in the present Big Bend, it has captured the stream which originally flowed northward into the Little Missouri. Since that time, the Belle Fourche Valley has been deepened about 100 feet, for there is a bank of about that height in the Big Bend. By the same process of excavation, a stream robbery by the Belle Fourche could likewise eventually divert the Upper Little Missouri River.

The Red Valley is another conspicuous feature, chiefly because of the red color of its soil and the absence of trees. The main forests of the Black Hills end at the margin of the limestone slopes which mark the beginning of Red Valley. In some places this valley attains a width of more than six miles, although it is much narrower where the strata dip steeply.

The topography of the basin ranges in elevation from 2,600 feet, where the river leaves the area to the east in Meade County, South Dakota, to 7,140 feet on Crooks Tower, Lawrence County, South Dakota. The lowest altitude in Wyoming is located where the Belle Fourche River crosses the Wyoming-South Dakota line at an elevation of 3,125 feet.

## Geology

The Belle Fourche River Basin is developed on a great thickness of soft sedimentary rocks, including sands, clays, and coal seams. The Black Hills, carved from an elliptical dome-shaped anticlinal uplift of the earth's crust, consist largely of rocks that are older than those forming the surface of the surrounding plains and around which there is upturned a nearly complete sequence of sedimentary formations ranging in age from upper Cambrian to latest cretaceous, all dipping away from the central core and toward the plains.

Rocks of sedimentary origin are by far the most extensive in the basin, and consist of successive strata of limestones, sandstones, and shales, ranging in age from middle Cambrian to Recent. Metamorphic rocks, consisting of schists, conglomerates, quartzites, and limestones are next most extensively exposed, but are found almost exclusively in the Black Hills uplift area. The highly metamorphosed sediments of Pre-Cambrian age contain the most valuable ore bodies in the Black Hills, and make the Homestake Mine, at Lead, South Dakota, one of the greatest gold mines in the world.

The igneous rocks, ranging in age from Pre-Cambrian to Tertiary, are of relatively slight extent in the basin, and consist of intrusive outcrops in detached areas extending across the Black Hills uplift. Most of these rocks have been intruded as laccoliths among the sedimentary rocks at different horizons. The most notable intrusive-igneous masses constitute Warren Peaks, Missouri Buttes, and Devil's Tower.

## Drainage and Water Supply

The area is drained by the Belle Fourche River and its numerous tributaries. It is a typical plains stream with highly erratic flows, except for more stable flows from some of the Black Hills streams. From its headwaters in southwestern Campbell County, Wyoming, the river flows in a northeasterly direction for approximately 120 miles, then bends abruptly southeastward to skirt the Black Hills uplift, flowing parallel to the strike of the rocks for about sixty miles, and finally flowing irregularly eastward to leave the area. Except for the larger streams draining the mountainous portions of the Black Hills, practically all of the numerous tributary drainages have a more or less intermittent flow, and, for that reason, they are not very dependable as sources of irrigation water. Principal streams extending the Belle Fourche from west to east are Donkey, Inyan Kara, Beaver, Hay, Redwater, Owl, Whitewood, Indian, and Willow Creeks. Redwater Creek is the most important perennial stream, receiving its flow from streams rising in the Black Hills, namely: Sand, Crow, Spearfish, and False Bottom Creeks.

Because of erratic flows of the Belle Fourche River, storage facilities are necessary to assure adequate water supplies for irrigation. The Belle Fourche Reservoir, located northeast of the Town of Belle Fourche, South Dakota, provides for storage of water for the irrigated lands on the Belle Fourche Reclamation Project. The reservoir impounds about 192,000 acre feet of water by means of an earthen dam, 6,262 feet in length and 97 feet in height, across Owl Creek Valley. Water is diverted from the Belle Fourche River into the reservoir by means of a feeder canal with an intake approximately two miles below the town of Belle Fourche. It has at times been found necessary to bypass high flows at this diversion because of high silt content of the flood waters.

Construction of Keyhole Reservoir in the west-central portion of the basin will stabilize the water supply for the Belle Fourche Project so as to permit the irrigated acreage to be maintained at an average of approximately 48,000 acres. Definite plans provide for irrigation storage of 130,000 acre feet; flood control, 140,000 acre feet; and sediment storage, 70,000 acre feet. It is the largest reservoir proposed by the Bureau of Reclamation for development on the minor western tributaries of the Missouri River, as shown in Senate Document 191. Now under construction, Keyhole Dam will be completed in 1952. Public lands tributary to the proposed reservoir constitute about four to five per cent of the gross area of the watershed.

An interstate compact for the Belle Fourche River Basin, approved March 4, 1943, allocates 10 per cent of the unappropriated water of the Belle Fourche River to Wyoming, and provides that the allocation shall be exclusive of waters for domestic and livestock needs. Stock water reservoirs are restricted to a 20 acre-feet storage capacity. Wyoming also has the privilege of purchasing, at cost, not to exceed 10 per cent of the total storage capacity of any reservoir which may be constructed in Wyoming. Such reservoirs would be built to store water for use in South Dakota.

#### Climate

Located near the geographical center of North America, the Basin is influenced by inland continental climatic conditions. It is characterized by a dry atmosphere with moderately low, unevenly distributed rainfall; by the extremes of summer heat and winter cold; and by a large proportion of clear days. Average annual precipitation ranges from about twelve inches in southwestern Campbell County to more than 25 inches in the Black Hills area. Climate of the Black Hills is more favorable for livestock and crop production than that prevailing on the adjoining plains. Precipitation is greater, and the hills afford protection from extremes

of temperature, as well as from the winds, which are free to sweep across the plains.

The average frost-free growing period varies from less than 90 days, at higher elevations in the Black Hills, to 145 days in northern Lawrence County, South Dakota. Summer temperatures of over 100 degrees F. are not uncommon, and winter temperatures of 42 degrees F. below zero and lower are on record. Usually these extremes are infrequent and of short duration.

The uneven and unreliable distribution of rainfall, both annual and seasonal, often accompanied by extremes in temperature, is perhaps the principal handicap to diversified crop production, except on irrigated lands. Crop yields may be very poor over the entire area during the dry years. During relatively wet years, good crops may be general. In some parts of the basin, hailstorms often cause heavy losses to planted crops. For the stockman, a reserve supply of winter feed is imperative to tide over emergency periods of prolonged cold spells, blizzards, and heavy snow storms.

### Soils

Soils have been for the most part developed from shales, sandstones, and limestones, and vary considerably, depending on the present material and the relief. The Pierre lismas are the dominant soils of a large area in the western, northern, and northeastern parts of the basin, at elevations ranging up to nearly 5,000 feet. Their characteristic slate or olive-brown color, and their heavy, sticky, plastic nature, are distinguishing characteristics. They are derived mainly from the sedimentary Pierre and Graneros geological formations, and these unaltered or partially weathered shales are often within a depth of three feet on smooth areas, and invariably exposed on eroded slopes. Lime may occur in the surface soils, and is generally abundant at depths of two feet. Where sandstone cappings have overlain the shales, the mixture of the weathered sandstone and shales have produced some areas of sandy clay loams, sandy loams, and loams. Clay, clay loam, and silty clay loams, however, predominate on the Pierre soils.

Soils developed over sandstones, such as the Fort Union and Fox Hill geological formations, are mainly sandy loams with areas of red loam and sandy loams. The surface of these soils are generally undulating to gently rolling, and both surface and internal drainage is good, but often the soils are shallow. High terrace deposits, products of an earlier drainage system, are present in various places. Undoubtedly, they were originally much more extensive, but with the degradation of the country, a large amount of the material has been

removed or widely scattered. They consist mainly of relatively thin layers of gravels and sands, but often include more or less loam.

Alluvial deposits cover areas of moderate extent along Belle Fourche River and its tributaries. These deposits consist chiefly of loam, sand, and gravel derived from the neighboring outcropping rocks. These deposits are not notably present in the steeper canyons and draws of the higher regions where erosion predominates over deposition, but they do extend up nearly all of the larger valleys and merge into the general talus and soil wash of the hill slopes. Some rather extensive areas of sandy soils are found in the vicinity of the Big Bend of the Belle Fourche River. In the southeastern portion of the Basin, sandy loam soils are most prevalent, with rocky soils on the ridge tops and deep loams in the more level drainage ways. Where the parent materials are calcareous, such as in the Limestone Plateau area, there may be a light gray layer of lime concentration in the sub-soils. Soils in the western portion of the area adjoining the Powder River divide are frequently loams and fine sandy loams of the Ulm and Lismas series, largely used for dry-farmed grain.

Soils in the Black Hills do not exist as large uniform areas, but are exceedingly complex. Parent materials are igneous, sedimentary, and metamorphic rocks, either in place or in the form of talus slopes, terraces, or outwash fans. They may vary greatly in color, texture, structure, depth, stoniness, and relief in short distances, though they are mostly shallow, stony, and lacking in very definite profile development. In the vicinity of the Bear Lodge Mountains, the higher elevations have sandy to sandy loam soils, while the lower elevations are characterized by loams, clay loams, and clay soils. Red soils derived from Spearfish formation encircle the Black Hills in an irregular narrow band.

### Vegetation

Vegetation in the Belle Fourche River Basin is comprised of the short-grass and mid-grass types in the plains area, while the coniferous forests of the Black Hills occupy a relatively smaller area in the higher altitudes. The short-grass type consists mainly of blue grama, buffalo grass, needle-and-thread, prairie junegrass, threadleaf sedge, Sandberg blue grass, bluestem wheatgrass, and a scattering of many herbaceous plants, such as the purple coneflower, goldenrod, and *Psoralea*. This type is characteristic of the better soils and reaches its maximum development on the light to medium textured loam soils. During a series of wet years, the mid-grasses are much in evidence. Various associations of this type dominate a large part of the basin, the most frequent type combination being blue grama, threadleaf sedge,

prairie junegrass, and bluestem wheatgrass.

Sagebrush and bluestem wheatgrass are the dominant species on the heavy impervious clay soils. These plants are associated with prairie junegrass, blue grama, threadleaf sedge, needle-and-thread, annual saltbush, Gardner's saltbush, and other species. The plant cover is rather open and varied, and has a lower grazing capacity than that of the short-grass type. Evidence that considerable sheet and gully erosion has taken place during comparatively recent years on this type attests to its marginal nature. Much of the public domain within the basin is associated with this type, which has markedly improved in forage cover during the past few years of favorable climatic conditions.

The vegetative cover of the forested area of the Black Hills may be said to consist principally of three types: grassland, brush, and forest. The dominant vegetation of the grasslands usually consists of blue grama, Sandberg bluegrass, pinegrass, prairie junegrass, three awn, green needlegrass, brome grasses, fescues, wheat grasses, and some buffalo grass. This type comprises about ten per cent of the forested zone. The brushlands may consist of dense thickets of aspen and paper birch on the moist slopes and in the draws of the higher elevations, or aspen and bur oak at the lower fringes of the forest. There is much underbrush, such as hawthorn, serviceberry, gooseberry, snowberry, chokecherry, and ground juniper. The most characteristic grasses on the more open sites of the brush lands are big bluestem, Canada wildrye, and brome, with squirrel tail and redtop locally conspicuous. Among the herbs are horse mint, goldenrod, false solomon seal, thistle, brittle fern, twinflower, wintergreen, and wild strawberry. The brush type comprises probably less than five per cent of the forested area, occupying severely burned-over areas.

The timbered areas of the Black Hills are comprised preponderantly of Ponderosa Pine in pure dense stands. These dense, dark stands, visible for miles, account for the name "Black Hills." The region is the meeting place of many eastern and western species of trees and shrubs, although in contrast with most timbered areas, the stands vary little as to species of timber with differences in altitude. Besides Ponderosa pine, the only other commercially important tree is western white spruce, which is found along stream bottoms and on steep north-exposed canyon slopes, occasionally occurring in pure stands of limited extent on the Limestone Plateau. This is the eastern limit of important commercial stands of Ponderosa pine. Very limited amounts of lodgepole pine and limber pine are present. Other plants more or less associated with this type are Rocky mountain juniper, ground juniper, aspen, paper birch, and bur oak. Grasses are relatively unimportant in the pure timber stands, and consist mainly of scattered pinegrass (*Calamagrostis rubescens*), alpine timothy (*Phleum alpinum*), little bluestem (*Andropogon scoparius*),

and squirrel tail (*Sitanion hystrix*). The Ponderosa pine type comprises nearly ninety per cent of the Black Hills portion of the basin and about ten per cent of the whole basin. This type is of high economic importance to the whole northern Great Plains, not only because of its sustaining yield of timber products, but also because of its high benefits for watershed, wildlife, scenic, recreational, and grazing purposes. Nowhere else does Ponderosa Pine grow in such dense stands, especially on cut-over or regrowth sites. The density of reproduction is a serious problem, as intense competition interferes with timber production and forest regrowth.

### Transportation

Transportation facilities through the basin are quite adequate although some of the county and unimproved roads which traverse the area become virtually impassable during wet weather. The western half of the basin is serviced by the Billings-Lincoln line of the Chicago Burlington, and Quincy Railway, through Moorcroft and Gillette, Wyoming. The eastern half and the Black Hills are serviced by branch lines of that road and of the Chicago and Northwestern Railway, which terminates at Belle Fourche and Newell, South Dakota. A twenty mile extension of this line from Belle Fourche, South Dakota to Colony, Wyoming has been constructed to provide for the marketing of bentonite products. Branch lines of the two railroads provide outlets for the mining towns of Lead and Deadwood, South Dakota. The Chicago and Northwestern Railway branch line is served by two of their lines, which terminate at Rapid City, one being from Pierre, South Dakota, and the other originating at Chadron, Nebraska, on their Omaha to Lander, Wyoming line. The Black Hills branch line of the C.B. & Q. originates at Edgemont, South Dakota, on the Billings-Lincoln line. It extends northward, through Custer, to Lead and Deadwood. Bus service connects the principal towns and cities of the area. Buses operate on the main highways. Truck freight lines serve all of the cities and towns of the area. There is no airline service within the area.

Eleven Federal and State highways make the area readily accessible to the residents and touring public. They are U.S. Highways 14, 16, 85, and 212; South Dakota Highways 24 and 79; Wyoming Highways 59, 116, 385, 387, and 585. County roads connect with these highways to make the most remote areas easily accessible in fair weather.

### Population

An estimate of the 1950 census indicates a total population for the tri-state basin of 36,000 people, of which approximately one-third are rural. Over one-fourth of the population resides in the mining cities of Lead and Deadwood, South Dakota. Lead is the largest city

in the basin. The principal towns and their 1950 populations are shown in the following list:

<u>South Dakota</u>		<u>Wyoming</u>	
Lead	6419	Gillette	2200
Belle Fourche	3517	Sundance	885
Deadwood	3270	Moorcroft	497
Spearfish	2750	Hulett	150
Newell	642	Colony	141
Whitewood	210	Rozet	50
Nisland	183	Alva	42
Vale	108		
St. Onge	214		
Central City	94		
Fruitdale	81		
Total population in towns and cities		21,700	
Total population on farms and ranches		14,300	
Total population of area		36,000	

### Agriculture

Agricultural land use in the basin varies from extensive ranches in the north and west to intensive truck farms near some of the cities in the Black Hills. There is a considerable area of dry-farmed land in the basin, particularly in the western portion. A few of these farms are exclusive wheat enterprises, but most of the dry farming is combined with a livestock enterprise, usually beef cattle. Most of the ranches produce some hay for winter feed, either by irrigation, from natural hay meadows, or from draws and bottom lands. Irrigation farming is important in the area, particularly on the Belle Fourche Reclamation Project in South Dakota.

According to the 1950 report of the Bureau of Reclamation, there were 59,129 acres classed as irrigable for the Belle Fourche Project, 55,572 acres being irrigated. This area produced crops valued at \$1,981,514, or \$36.36 per acre. Principal types of crops and their values were: cereals, \$506,077; hay and forage, \$826,130; sugar beets, \$348,407; seeds, \$38,143; beans, potatoes, and garden, \$51,002. Among the cereals, barley leads with \$149,148; followed by wheat, \$135,031; corn, \$107,632; and oats, \$103,760. Some alfalfa seed was produced. Alfalfa was the leading hay and forage crop, with a value of \$464,140. Potatoes lead in value per acre, with \$281; sugar beets were second, with \$94; alfalfa seed third, with \$54; followed by corn, with \$36; alfalfa hay, \$32; and wheat, \$32. Sugar beet yield was low, being only 9.6 tons per acre. Irrigated pasture doubled in area on the

project in 1950 as compared with 1949. Land use for the net irrigated area in per cent for 1950 was as follows: pasture, 25.1; alfalfa, 19.6; barley, 12.6; corn, 11.3; oats, 8.2; wheat 7.9; hay 7.2; sugar beets, 6.7. Crop returns per acre on the project have varied from an average of \$24.61 in 1943, to \$39.98 in 1949, during the ten years 1941-50.

There were 5,599 beef cattle on project farms in 1950 valued at \$769,150. Dairy cattle numbered 2,500, valued at \$489,875. Sheep totaled 64,867, with a value of \$1,297,340, making them the most important class of livestock on the project. Hogs numbered 2881, valued at \$90,420. Chickens and turkeys numbered 26,602, with a value of \$33,332. Farm equipment was valued at \$1,654,024.

The project has 410 farms with a population of 1709 persons. There are five towns on, or adjacent to, the project with a population of 4,744 people. There were 22 schools, the same number of churches; and 3 banks, with deposits of \$10,010,442, and 7,023 depositors in 1950. Duty of water on the project was low, only 1.07 acre feet per acre being used in 1950. The system has a low efficiency, particularly in view of area development having been restricted because of shortage of water. The system delivered 59,001 acre feet of water to farms with total losses of 64,523 acre feet. Water cost varied from \$1.50 for class 5 land to \$3.00 per acre for class 1 land.

Irrigated areas outside of the Belle Fourche Project comprise an area of approximately 11,000 acres in South Dakota, and 1500 acres in Wyoming. Most of these irrigated lands occupy the more fertile alluvial loam soils along Redwater Creek and its principal tributaries: Spearfish, Falsebottom, and Crow Creeks. The principal crops are tame hay, alfalfa, small grains, sugar beets, with some specialized truck farming in commercial quantities to supply local demand. The latter type of enterprise predominates in Spearfish Valley. Livestock is an important feature of nearly all of the farms, being about equally divided in importance among beef cattle, dairy stock, and sheep.

Livestock farming is the dominant type of agriculture over an extensive portion of the basin where dry farming prevails. Hay and small grains constitute the principal crops, nearly all of which are utilized during the three to four month winter feeding season. The leading cash crop is wheat, followed by such short season grains as oats, barley, rye, and miscellaneous crops consisting of flax, alfalfa seed, potatoes, and dry beans. While crops are produced primarily for livestock feeding, the production of cash crops has an important place in farming income throughout the basin.

Beef cattle predominate on the range lands. The sheep within the dry and irrigated farming areas are owned and run in comparatively small flocks. In the Black Hills area, both sheep and cattle are summer grazed in the Black Hills National Forest from about June 1 to September 15, and wintered at the home ranches. The greater part of the gross income in the livestock farming areas comes from the sale of livestock and livestock products.

### Mining

Mining is the outstanding industry of the Belle Fourche Basin, producing over \$15,000,000 annually at present, a value which has been greatly exceeded in the past. A wide range of mineral reserves comprises the most important resource of the area. Most of the minerals are in the Black Hills. Coal, bentonite, oil, and gas are in the central and western portion of the basin. The famous Homestake Mine, "the richest gold mine in the United States," produces most of the mineral wealth of the area. Located at Lead, this property produced \$12,658,000 worth of gold and silver in 1948. In addition, lead and zinc, valued at \$13,400, was produced. A few small mines also produce gold and silver.

The most important mineral resource of the Belle Fourche Basin is the low grade gold deposits in the vicinity of Lead, South Dakota. The Homestake Mine produced \$21,649,000 in gold, and \$113,754 in silver in 1940. Discovered in 1874, it has produced almost continuously since that time. The Bureau of Mines reports a total production between 1876 and 1946, inclusive, of bullion and concentrates that brought a return of \$451,975,133. Silver, accompanying the gold, is relatively small in amount and value, but is important. The Homestake produces 95 per cent of the total value of metals from the Black Hills area; the Bald Mountain Mine, about four miles west, producing most of the remainder. The total value of metals, including gold, silver, copper, lead, and zinc, produced up to and including 1946, is reported to be \$525,256,862.

Profitable operation of the Homestake Mine, despite the great value of its production, has been an increasing problem in recent years because of the low grade of the ores, depth of the workings, and costs. Profitable operation is possible only by exceptional management and engineering skill. To cut costs, the company has produced its own lumber, power, and coal. The mine deserves more than passing mention for it has played an important and colorful part in national and local history, economy, and finance. It has provided the fiscal base for one of America's best-known families and fortunes, the Hearsts, long prominent in politics, publishing, and mining.

Extensive deposits of sub-bituminous coal in the western portion of the basin are estimated to include 15 billion tons of reserves. The Wyodak Coal Company strip mines a 100-foot vein of coal located east of Gillette producing about 300,000 tons annually. Most of this coal is utilized at the two thermal electric plants in the vicinity. The steam plant at Wyodak has an installed capacity of 5,000 kilowatts, and the steam plant at Osage has an installed capacity of 21,500 kilowatts. The Wyodak plant is owned and operated by the coal company, a subsidiary of the Homestake Mine, to produce power for the Mine. The Osage plant is a unit of the Black Hills Light and Power Company. Power produced is distributed over the basin and Black Hills area. The company is considering additional thermal power production in the vicinity. Two other important minerals in the area are bentonite and gypsum. Deposits of both are extensive in the basin. Production of bentonite is an important industry. Rail shipments of bentonite from Belle Fourche, South Dakota, for the year 1950, were estimated to exceed one quarter of a million tons. Production in the basin at the present time is confined to two areas, one in the Belle Fourche region, and one in the vicinity of Moorcroft, Wyoming. Processing plants are found in both of these regions, where the thickest seams of good quality high-swelling bentonite are exposed in the upper Graneros formation which encircles the Black Hills.

Large deposits of good quality gypsum in thick beds surround the Black Hills and Bear Lodge Mountains. The beds are close to the surface and range from 8 to 60 feet in thickness. The only limitation on use of this resource is economic shipment. Demand within the trade area is relatively limited, and production facilities have never been used to capacity. Gypsum was mined and processed in the basin north of Spearfish from 1898 to 1912, but since 1912 production has been confined to deposits south of the basin. The deposits are an important resource, with possible future development for agricultural use, in the manufacture of wallboard and other building materials, plaster, sulphur, and chemicals.

Petroleum has been discovered at the Rocky Ford, Wakeman Flats, Moorcroft, and Upton-Thornton fields, but the quantity produced is small.

Tin ores have been prospected in the Nigger Hill area, near Tinton, South Dakota, and reserves are estimated by the U.S. Geological Survey at about 500,000 pounds of metallic tin. However, at present prices, it is not mineable. Tungsten, tantalum, caesium, and columbium are also present in that area in small amounts. A small production of tin and the other metals, principally from placers, has been reported in former years.

Scrap mica has been produced in small quantities from the Nigger Hill area. It is used principally as a constituent of certain types of roofing materials and paints. Recent prospecting has shown the presence of radioactive minerals in the Devils Tower area. Low grade rare earth deposits have recently been found widely distributed in the mountains north of Sundance. In addition to all of these possibilities, and the production of gold, silver, lead, and zinc, there are known deposits of fluorspar, manganese, pegmatite minerals, antimony, iron, tungsten, and graphite in the Black Hills. Some of these deposits may be suitable for commercial development.

### Forestry

The timber industry is one of the most important industries in the Basin, with an estimated 45 lumber mills of varying output in operation at the present time. Approximately 400,000 acres of productive Ponderosa pine timber land contain nearly one billion board feet of merchantable timber, the greater portion being within the Black Hills National Forest. Timber cutting in the national forest is on a sustained yield basis. Timber in the area is located in the Black Hills and in the Bear Lodge Mountains. The first sale of timber from national forest lands in the United States was made to the Homestake Mining Company on the Black Hills National Forest in 1898.

The Homestake Mining Company constructed a model sawmill at Spearfish, South Dakota, in 1940. This mill has a daily output of 75,000 board feet. The annual requirement for mining operations is about 13 million feet, about one-third of which is in the form of 12-to 14-inch mine timbers, and the remainder in dimension stock. The company owns about 25,000 acres of productive timber land, and another 90,000 acres is in other forms of private ownership, mostly in small tracts. This privately owned timber land is frequently deficient in growing stock as a result of past cutting practices, bark beetle infestations, or fire. Much of this land lies within the exterior boundaries of the Black Hills National Forest. Outside of the National Forest, in Crook County, Wyoming, there are scattered tracts of public domain which support some stands of merchantable timber. Most of the timber on the public domain lands is in scattering stands of immature or stagnated Ponderosa pine.

According to records of the Forest Service, losses by forest fires have averaged annually about 1,000 acres burned area on National Forest lands within the basin, an excellent control record of 0.4 per cent. Timber damage caused by Black Hills bark beetle has been estimated to be as high as a million board feet annually. Extensive infestations have been successfully controlled in the past, and, at the present time, there are several control crews engaged in combatting this insidious enemy of the forest.

Black Hills Ponderosa pine makes a soft wood lumber which is readily worked. It is highly valued for mill work, sash, doors, and finish lumber. The Warren Lamb Lumber Company operates a large mill south of the basin, specializing in finish lumber and mill work. Some logs are shipped to this mill from the Belle Fourche Basin. Most of the Black Hills pine harvested is small trees, so the percentage of clear lumber is relatively low. The dense stands of pine have a growth habit more closely resembling lodge pole stands than typical Ponderosa stands found elsewhere. The smaller trees make excellent poles and posts.

### Recreation

The Black Hills are a mecca for tourists from the northern plains states and from all over the nation. Many of the features of the Black Hills are within the basin, such as the old and new mining districts, and the others, including Rushmore National Memorial, are nearby. Other important recreational features of the basin are the Devils Tower National Monument and the Bear Lodge Mountains in the Black Hills National Forest in Wyoming. Belle Fourche Reservoir provides aquatic recreational features of local interest. Black Hills communities stage rodeos, pageants, and other celebrations each summer, largely for the benefit of visitors. The Black Hills offer outstanding scenic attractions, fishing, hunting, swimming, and winter sports.

Completion of Keyhole Dam will create a large lake which will provide an important recreational resource for northeastern Wyoming. There are a number of caves in the limestone formation, the best known being located in the southern Black Hills adjacent to the area.

### Wildlife

Wildlife is relatively abundant throughout the Basin. Antelope are numerous in the open range areas. Whitetail and mule deer are common in the rough lands of the stream breaks. The forested areas also provide an excellent habitat for mule deer, whitetail deer, and elk. Fur-bearing animals include: beaver, muskrat, fox, coyotes, raccoon, martin, and skunk. Game birds include: sage hens, pheasants, ruffed and sharptail grouse, and wild ducks. Belle Fourche Reservoir is set aside as a Federal migratory bird refuge.

The trout fishery of the Black Hills streams is an important resource of the area. Streams within the basin which are regularly stocked with trout are estimated to total about 275 miles. A Federal fish hatchery is located at Spearfish. Belle Fourche Reservoir is a favorite among local fisherman; and numerous other lakes, ponds, and small reservoirs are stocked with fish.

The South Dakota Department of Game, Fish, and Parks has acquired three farms near Spearfish, totaling about 2,600 acres, to provide for supplemental winter feeding of game animals forced out of the Black Hills during the critical periods of deep snows. Construction of a state fish hatchery is contemplated on one of these acquired properties on Crow Creek.

#### LAND OWNERSHIP AND MANAGEMENT PROGRAMS

The area comprises approximately 3,604,000 acres of which 79 per cent, or 2,852,690 acres, are privately owned lands. Of the remaining lands, 15 per cent is in various types of Federal ownership, and 6 per cent is State owned. A detailed analysis of land status in the basin is presented in table 1. Acreage of four types of Federal ownership and the amount of state and private lands are given for each county and state in the study area. Ownership of land in Belle Fourche River Basin in area and percentage is summarized below:

Type of Ownership	Acres	Per Cent
Private	2,852,690	79.0
Federal		
Dept. of Interior	195,767	5.5
Dept. of Agriculture	332,188	9.5
Total	527,955	15.0
State	223,587	6.0
Total	3,604,232	100.0

Black Hills National Forest covers a gross area of 484,962 acres within the basin, of which 315,493 acres are controlled by the Forest Service, and 169,469 acres are in private ownership. The Devil's Tower National Monument, containing 1,194 acres, is administered by the National Park Service. It has the distinction of being the first National monument to be created, being established by proclamation of President Theodore Roosevelt in 1906 under authority of the Antiquities Act. Located 29 miles northwest of Sundance, Wyoming, the monument entrance is seven miles north of U.S. Highway 14.

The Thunder Basin Land Utilization Project, Wyoming No. 21, covers a gross area of about 200,000 acres in Campbell and Weston Counties, Wyoming. The Soil Conservation Service of the Department of Agriculture is the administrative agency. Only a small portion of this

project is in the Belle Fourche Basin, the bulk of it being in the Cheyenne River watershed, to the south. Submarginal lands in the area, totaling 16,695 acres, were purchased under Title III of the Bankhead-Jones Act and the Federal Relief Act. These purchases by the Federal Government in the Thirties were to aid in stabilizing the agricultural economy of the area, and to prevent soil erosion. These objectives have now been attained, for the most part, as a result of improved management practices and favorable climatic conditions. The U.S. Experimental Station Farm at Newell, South Dakota contains 360 acres of irrigated crop land. This station, operated by the Bureau of Plant Industry, USDA, runs a wide variety of tests on crop rotations and soil fertility, and conducts annual sheep-feeding demonstrations.

The 15,256 acres of reclamation-withdrawal lands contained within the project area are for the most part lands surrounding or inundated by the Belle Fourche Reservoir, or are used for administrative and maintenance purposes. The Belle Fourche Wildlife Refuge is co-extensive with the reclamation-withdrawal lands surrounding the reservoir. The Keyhole Dam and reservoir located on the Belle Fourche River in northeastern Wyoming are scheduled for completion in 1952. The dam is 17-1/2 miles northeast of Moorcroft, Wyoming, in Crook County, about 146 miles upstream from the Belle Fourche Project. Keyhole Dam will be an earth-fill structure, 4,320 feet long at the crest. Maximum structural height of the dam is 164 feet. The storage capacity at normal water-surface elevation will be 200,000 acre feet. Total area within the taking area of the reservoir is 15,300 acres.

Lands owned by the state are leased to adjoining owners for grazing purposes; most of the tillable lands having already been sold. State lands comprise 223,587 acres, or six per cent of the total land in the basin. The University of Wyoming Experimental Farm, located near Gillette, Campbell County, Wyoming, contains about 800 acres. A wide variety of dry-land farming techniques and tests of crop rotations, shelterbelt plantings, and soil fertility are conducted here.

County lands are limited to administrative and road-material sites. Most of the county lands which remained unsold were within the Belle Fourche Project in Butte County. They have been gradually restored to private ownership. Thousands of acres of county tax lands were purchased by ranchers during the years 1946-1950.

There are two Soil Conservation Districts organized in Crook County, Wyoming, the Devils Tower SCD and the Redwater SCD. The Lawrence-Butte Soil Conservation District in South Dakota, organized in 1940, comprised parts of Butte and Meade Counties, and all of Lawrence County within the Belle Fourche River Basin. Constitut-

ing a gross area of about 591,000 acres, 64 per cent of the area is classified as forest and range lands; 29 per cent as cropland, one-third of which is irrigated; with the balance in other classes. The Lawrence-Butte Soil Conservation District has been divided into two districts: one district comprises all of Lawrence County and is known as the Lawrence Soil Conservation District; the other district, known as the Butte Soil Conservation District, contains parts of Butte and Meade Counties. Public domain lands comprise less than two per cent of all lands within these two districts. The Box Elder Soil Conservation District covers the portion of the basin within Carter County, Montana. The more important conservation practices of irrigated areas include farm planning, correct land use, crop rotations, land leveling, farm irrigation water distribution systems, improved water application and use, drainage, ditch lining, diversion dams, flumes, and noxious-weed control. On dry-land farms, the principal practices consist of contour farming, gully control, farm planning, correct land use, summer fallow, water spreading, trashy tillage, grassed waterways, crop rotation, and windbreak plantings. Range management practices include the construction of stock water reservoirs and spring developments to provide more uniform utilization of the range. Other range practices include proper stocking, water spreading, and range reseeding.

#### Lands Controlled by the Bureau of Land Management

The Bureau of Land Management has jurisdiction over 194,573 acres of land in the Belle Fourche River Basin. This acreage represents about five per cent of the total area. Public domain in the basin is of relatively low significance in relation to the present economy of the area, and will have little effect upon any contemplated reclamation or flood-control developments. Possible exceptions to the latter may be isolated tracts of public domain riparian to the Belle Fourche River. The South Dakota portion, which comprises less than one-third of the gross study area, contains 46 per cent of the public domain lands. Nearly all of the South Dakota public domain is in northwestern Butte County. The Wyoming portion constitutes two-thirds of the basin, but only four-tenths of all public domain lands are found in this part of the basin. The Montana portion is less than two per cent of the entire basin, but contains 14 per cent of all the lands administered by the Bureau of Land Management. The area in Montana is in a regularly constituted grazing district, Montana Grazing District No. 3, administered under the Taylor Grazing Act.

The public domain lands are primarily valuable for grazing of livestock and game and usually occupy areas of relatively poor soils or rough terrain on the open range. Although most of the land is leased for grazing, there is a large area of unleased vacant lands in

Table 1.—Summary of Land Status in Belle Fourche Basin, Montana, Wyoming, and South Dakota, 1951 (Acres)

State and County	Federal Lands						Total
	Withdrawals		Nat'l. Forests		Land Util. Title III	Total Federal	
	Stock Drive-way	Other	Nat'l. Parks	Nat'l. Forests			
<b>Wyoming:</b>							
Campbell	26,891	474	680	1,194	150,440	28,965	55,764
Crook	33,251	957	80	2,443	15,775	185,842	97,110
Weston	14,429					32,727	15,933
Sub-total	74,571	474	1,717	1,194	152,883	247,534	168,827
<b>Montana:</b>							
Carter	27,581						27,581
<b>South Dakota:</b>							
Butte	63,600	7,093	15,456		155,000	86,149	39,540
Lawrence	2,116				7,610	157,116	9,040
Meade	1,965					1,965	2,560
Pennington						7,610	
Sub-total	67,681	7,093	15,456		162,610	252,840	51,140
Totals	169,633	7,567	17,173	1,194	315,493	527,955	223,587
					16,695		2,852,690
							2,852,690
							3,604,232

the mineralized area surrounding Lead and Deadwood, South Dakota. These unleased lands are mountainous, rough, and some are covered with rocks or timber. Their use may be interfered with by mining claims and developments. In general, the public domain lands are scattered within the rougher lands of the basin. In exception to this general pattern, there are four localities in the basin in which considerable concentrations of public domain lands occur. It will be advisable to investigate the public domain land and adjacent land in other types of ownership in detail in these areas. Each area presents varying problems. Management, suitability, use, and problems of each of these areas should be considered in making the detail study of the Belle Fourche Basin. These four areas of public domain concentration are evident on the map of the area with this report. The location of each of the four areas is given in detail in the following pages. The apparent problems and a brief description of each of the four areas is also presented.

#### Sub-area 1

The greatest concentration of public domain is found in the extreme northern portion of the basin, in an area 12 to 30 miles north of Belle Fourche. This area includes part of the drainages of Crow, Owl, and Indian Creeks. It includes the Montana portion of the basin, forty-five sections in Wyoming, and eight townships in South Dakota. Public domain there covers an area of 80,000 acres and occupies about one-fourth of the range area in its vicinity. Unlike most of the basin, the lands administered by the Bureau of Land Management in this area are composed of comparatively large compact blocks. In much of the area the public domain lands dominate all other classes of land ownership. The lands are used for grazing in connection with adjacent privately controlled range lands, which is probably their best use. While cattle are the principal class of livestock, there are also some sheep in the area. The area also provides an excellent habitat for wildlife, especially antelope, which have been reported to exceed 6,000 in number in this vicinity. It is important that the public domain in this area be classified to determine its highest use and potentialities under properly integrated uses in order that an orderly program for administration and management, or disposition, may be developed. Land in this area is associated in use with that located in the adjoining Moreau and Little Missouri River basins.

Lands within the basin withdrawn for stock driveway are located in or near this area. With one exception, these withdrawals are found exclusively in Butte County, South Dakota. These withdrawn lands, although scattered and disconnected, form important links in an extensive trail system which radiates from the marketing town of Belle Fourche, South Dakota, reaching as far north and west as Buffalo and Camp Crook, South Dakota; Ekalaka, Powderville, and Broadus, Montana; and Hullett,

Sundance, and Beulah, Wyoming. Another less extensive, although locally important, trail system terminates at Newell, South Dakota, and serves the range area to the north and east in Butte, Meade, and Harding Counties. Despite the extensive use of trucks for livestock shipment, the estimated trailing use by livestock in the area during recent years is reliably reported to have exceeded 100,000 head annually for sheep and cattle. Fall shipping movement predominates in driveway use. Spring seasonal movement of both sheep and cattle onto summer ranges from the irrigated areas near Belle Fourche and Newell continues to be an important and regular trailing practice. Most of these trails are well established and usually follow county roads or state and federal highways. Livestock being trailed is consequently often restricted for many miles to the narrow confines of fenced-road right-of-ways. In the limited areas of open range, the customary practice of spreading out the trail herd oftentimes prevails.

Most of the parcels of land withdrawn for stock-driveway purposes are of special benefit for holding, watering, feeding, and resting trail herds, and have been so used for many years. To further assist ranchers who trail livestock to market, the Chicago and Northwestern Railway has obtained leases on strategically located lands containing water holes and feeding facilities. The annual expenditure for such leases has been reported to be about \$2,000. These are especially important links to the trail system, because little development of water has been made on stock-driveway withdrawals. Unlike the lands leased by the railroad for watering and rest-stop purposes, the exact location of the withdrawn lands are often unknown to the average trailer. Marking the boundaries of these lands and the possible development of additional water facilities are improvements which are apparently needed. Possible sites for these improvements should be investigated during the detailed study of the area.

Most farmers living in the Belle Fourche Irrigation District are engaged in the livestock business. These operators usually maintain flocks of 50 to 200 sheep. Because these flocks are too small to warrant the farmer's individual attention during the summer time, they pool the sheep to form a band of sufficient size to enable them to hire a herder during the summer grazing season. The small flocks are trailed through the lanes and county roads in the irrigated district to a common meeting place. There the small flocks are thrown together to form a complete summer band, employing one herder. These bands graze during the spring, summer, and fall on the range area of eastern Butte County. The scattered tracts of stock driveway withdrawals in this area make it feasible to trail the livestock to and from summer ranges.

Further intensive studies should be made of the entire stock-driveway problem, treating the combined trail system as an entity, regardless of watershed boundaries. The area affected comprises parts of the Belle Fourche, Moreau, Little Missouri, and Powder River watersheds. The users of the trail are vitally interested in the improvement, proper use, and perpetuation of the whole stock-trail system. The Livestock and Trails Committee of the Belle Fourche Chamber of Commerce are intimately acquainted with the problems, uses, maladjustments, and needs of the trail system. They are actively engaged in the betterment of trailing conditions.

#### Sub-area 2

The largest concentration of public land in the Wyoming portion of the basin is located in Campbell County, near the Weston County line. The area includes the drainages of Yellow Hammer and Dry Creeks, and minor portions of Four Horse and Whitetail Creeks drainages. The public domain land in this area is an irregular block of 18,500 acres located 15 miles east and 20 miles south of Gillette. These lands are located a few miles west of the Thunder Basin Land Utilization Project. This project, located in northeastern Wyoming, includes some lands in the Belle Fourche Basin area in Weston and Campbell Counties. The provisions of Title III of the Bankhead-Jones Farm Tenant Act of July 2, 1937 led to the establishment of this land utilization project. The gross area of the project, which includes lands in Weston, Campbell, and Converse Counties, is over one million acres. Lands in the project area are primarily used for grazing livestock and for the production of livestock feed. Executive Order 10046, dated March 25, 1949, transferred certain lands in the Thunder Basin Land Utilization Project WY-LU-21 from the Department of Agriculture to the Department of the Interior, and withdrew certain public lands for administration by the Department of Agriculture. This change of administrative jurisdiction in this area facilitated some of the management problems for both departments. Cattle ranches predominate in the Wyoming portion of the basin. Some mixed sheep and cattle outfits are also found, especially in the Weston County portion, where dry-land farming is practiced and livestock farming is the principal type of farming enterprise. The crops produced are largely utilized for livestock feed. The principal dry-farm crops are small grains and hay, with limited tracts of flood-irrigated hay meadows bordering Buffalo Creek. Heavy gumbo soils characterize the range area, which contains a short-grass type of vegetation interspersed with less extensive areas of sagebrush.

Further detailed investigation should be made in this area for the purpose of determining the interrelationships of the public domain with lands in other types of ownership. Plans should be

prepared for the proper disposition, management, and development of the public land resources in this area.

#### Sub-area 3

The third largest concentration of public domain, 9,000 acres in extent, is on the eastern extremity of the area in Butte County, six to ten miles east of Newell, South Dakota. These lands are located east of Willow Creek and north of the Belle Fourche River. This land is gently rolling to undulating in topography. The area has a good grass cover at the present time. The amount of precipitation received has been favorable for the range during the past five years. Management and utilization of the area has improved in recent years. This land is used for grazing as summer range in conjunction with the irrigated lands on the Belle Fourche Project. The relationship of these lands to the irrigation project should be studied in detail. Future management and proposed ownership of the public domain should be considered in the detailed investigation of the area.

#### Sub-area 4

In the vicinity of Lead, Lawrence County, South Dakota, there are approximately 2,100 acres of unappropriated vacant public domain, which are found at elevations ranging from 5 to 6 thousand feet. Surrounding the mining towns of Lead and Deadwood, the area is literally "plastered" with patented and unpatented mineral claims which comprise a part of the richest mineral-bearing area in the Black Hills. Between these numerous mining claims are many irregularly shaped tracts of vacant land, averaging 30 acres per tract, varying in size from less than 1/100 of an acre to one fairly compact block of 1,200 acres. The area lies adjacent to, and is entirely surrounded by, the Black Hills National Forest.

Most of the public domain in this area occupies rough ridge tops and steep, rocky slopes covered with second-growth yellow pine timber. None of it is leased at the present time, and no information is now available with regard to the extent of unperfected mineral claims. Proximity to the towns of Lead and Deadwood, and their location in the Black Hills, may make some of the tracts suitable for possible home sites or summer cabin sites. Watershed values of these lands are relatively high as compared with public domain located elsewhere in the basin. Further studies should be made of these tracts to determine their ultimate management and disposition. The total vacant unappropriated public land in this area should be determined. There are several hundred mining claims in this immediate area. The validity of these claims should be determined by our mineral examiner. Since these lands are surrounded by the Black Hills National Forest, we should

ascertain the interests of this agency relative to administration of the public domain lands. Management of the public domain lands in this area should be co-ordinated with that of the surrounding national forest. Fire protection is now afforded these lands by the Black Hills National Forest organization for the protection of their own adjacent lands.

#### Remaining Public Domain Lands

In addition to the public domain land in the four areas just described, there are 85,000 acres of public domain lands in the remainder of the basin. This land is in small tracts and is so scattered that it is difficult to properly administer or develop. These tracts comprise only slightly more than two per cent of the gross area of the basin. With few exceptions, they will have little effect upon any contemplated reclamation or flood-control developments within the basin. They do not have any relatively great significance in the present economy of the area.

There are a few scattered tracts of public domain situated in the vicinity of the proposed Keyhole Reservoir site which may have future value in the recreational development of the area. Approximately 1,000 acres have already been withdrawn in the form of power site withdrawals, most of which will ultimately be inundated. A few tracts of public domain at the Keyhole Reservoir site will be contiguous to the high water line of the reservoir. Future public values of lands surrounding the reservoir, which are now administered by the Bureau of Land Management, should be determined. Further detailed investigations should be made of all other tracts to determine their proper management or disposition.

Thirty-five timbered tracts are contiguous to the boundaries of the Black Hills National Forest. These tracts should be managed in conjunction with the Forest Service. There are 80 tracts containing approximately 8,000 acres of public domain surrounding the Black Hills National Forest in Wyoming, much of which is more or less timbered. These 80 tracts have a relatively high public value for watershed protection when compared with adjoining open range lands. This factor should be considered in making a determination in the ultimate disposition of these lands. A coordinated exchange program involving the state and all interested Federal agencies, as well as local land owners, may be an effective means of consolidating the public and forest lands into a better land pattern. Public interest may best be safeguarded by Federal management.













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